

INTRODUCTION AND PURPOSE OF REPORT

The New Hampshire Department of Environmental Services (DES), under the authority granted by RSA 143:21 and 143:21-a, is responsible for classifying shellfish growing waters in the State of New Hampshire. The purpose of conducting shellfish water classifications is to determine if growing waters are safe for human consumption of molluscan shellfish. DES uses a set of guidelines and standards known as the National Shellfish Sanitation Program (NSSP) for classifying shellfish growing waters. These guidelines were collaboratively developed by state agencies, the commercial shellfish industry, and the federal government in order to provide uniform regulatory standards for the commercial shellfish industry. The NSSP is used by DES to classify all growing waters, whether used for commercial or recreational harvesting, because these standards provide a reliable methodology to protect public health. Furthermore, RSA 485-A:8 (V) states that “Those tidal waters used for growing or taking of shellfish for human consumption shall, in addition to the foregoing requirements, be in accordance with the criteria recommended under the National Shellfish Program Manual of Operation, United States Department of Food and Drug Administration.”

This document represents the fourth Annual Report of the DES Shellfish Program. The preparation of an Annual Report serves two purposes. The first is to comply with the NSSP requirement for an annual review of growing area classifications. The second is to report to the citizens of the State of New Hampshire on the activities and accomplishments of the DES Shellfish Program, to describe water quality status and trends in shellfish growing areas, and to outline future activities to improve water quality and expand harvesting opportunities.

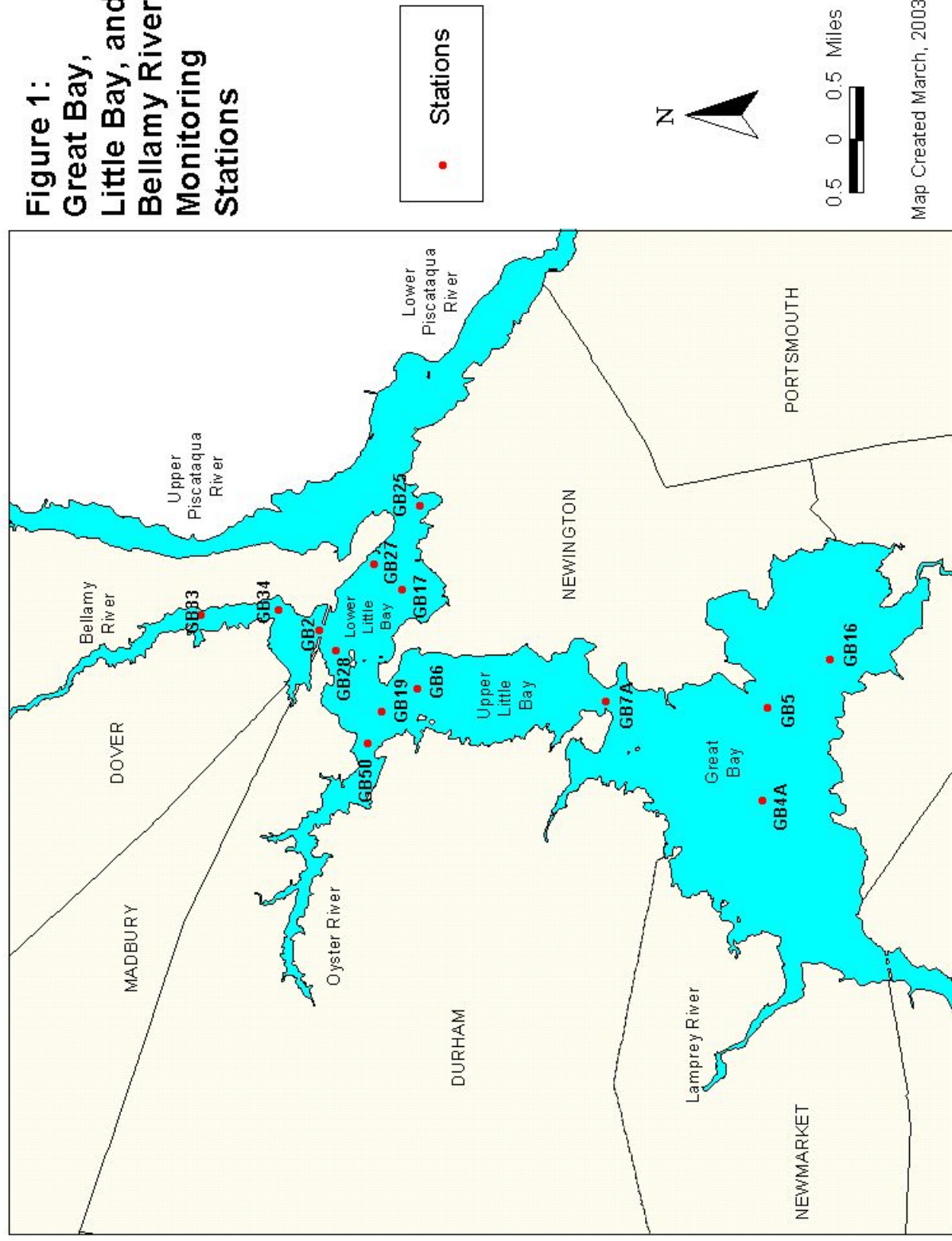
PROGRAM ACTIVITIES AND ACCOMPLISHMENTS

Monitoring Programs

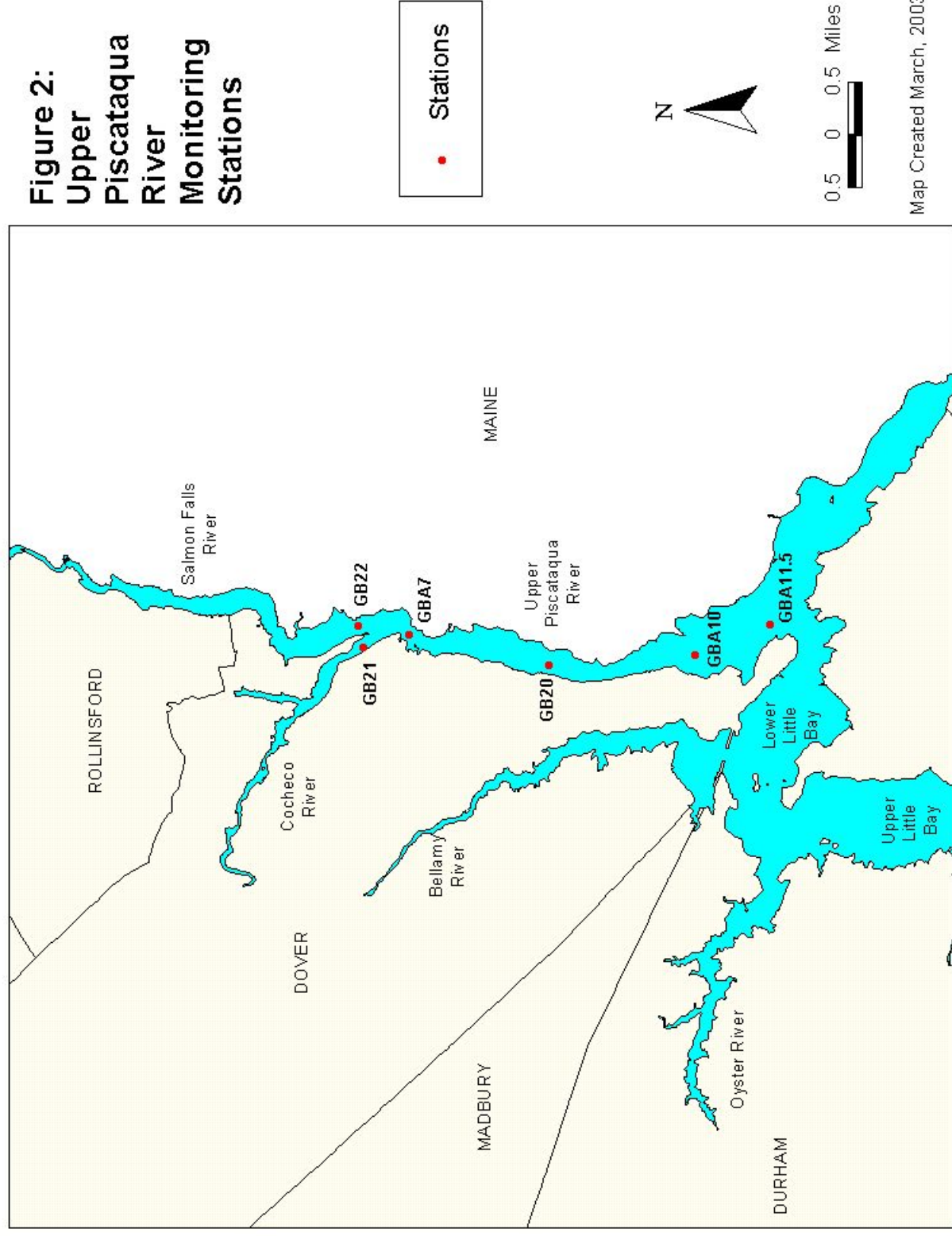
Routine Monitoring

The DES maintains a routine shellfish water-monitoring program in all tidal waters in the State of New Hampshire. The focus of this program is to collect and test water samples for fecal coliform bacteria, which is used as an indicator of contamination from human or animal waste. Data generated by this program are used to annually review shellfish water classifications. Seventy-six stations in the Great Bay Estuary (including the Piscataqua River), Little Harbor/Back Channel, Rye Harbor, the Atlantic Coast, and the Hampton/Seabrook Estuary were sampled on a monthly basis for most of the year in 2003. Almost 800 samples (56 sampling runs) were collected in 2003, in accordance with the Systematic Random Sampling Strategy described in the NSSP. Figures 1-5 depict growing areas and sampling stations. Appendix 1 lists current classification and acreages for all growing waters, while Appendix 2 presents the most recent 30 water samples collected as part of the Systematic Random Sampling program. Water quality in areas currently open to harvesting is generally good, although some sites show rainfall-related impacts that require management on a conditional basis. The 2004 routine shellfish water-monitoring program will be conducted in a manner similar to the 2003 program. Results from the routine monitoring program are reviewed in the “Update of Growing Area Classifications” section of this report.

**Figure 1:
Great Bay,
Little Bay, and
Bellamy River
Monitoring
Stations**



**Figure 2:
Upper
Piscataqua
River
Monitoring
Stations**



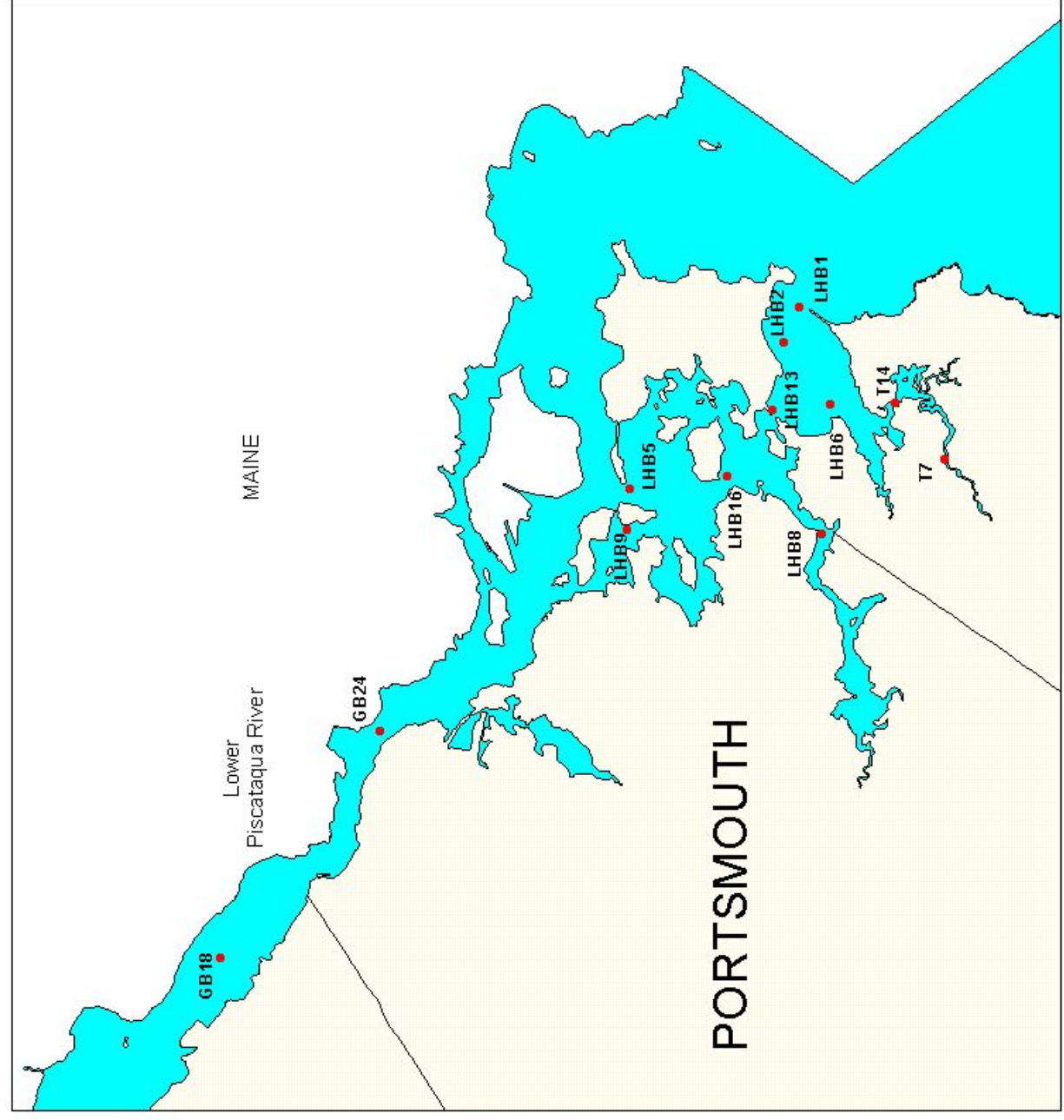
**Figure 3:
Lower
Piscataqua River, Little
Harbor and
Back Channel
Monitoring
Stations**

• Stations

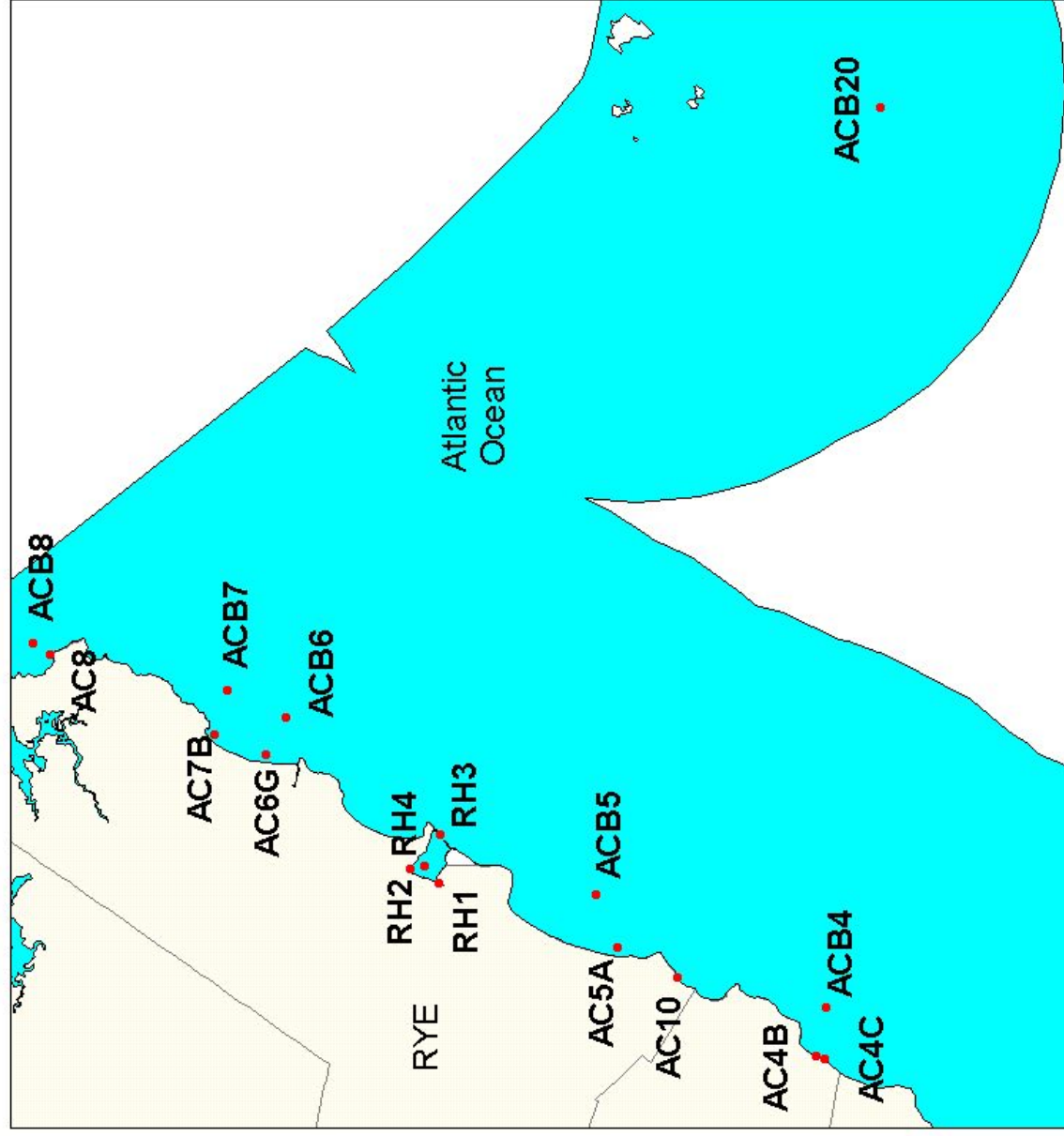


0.2 0 0.20.4 Miles

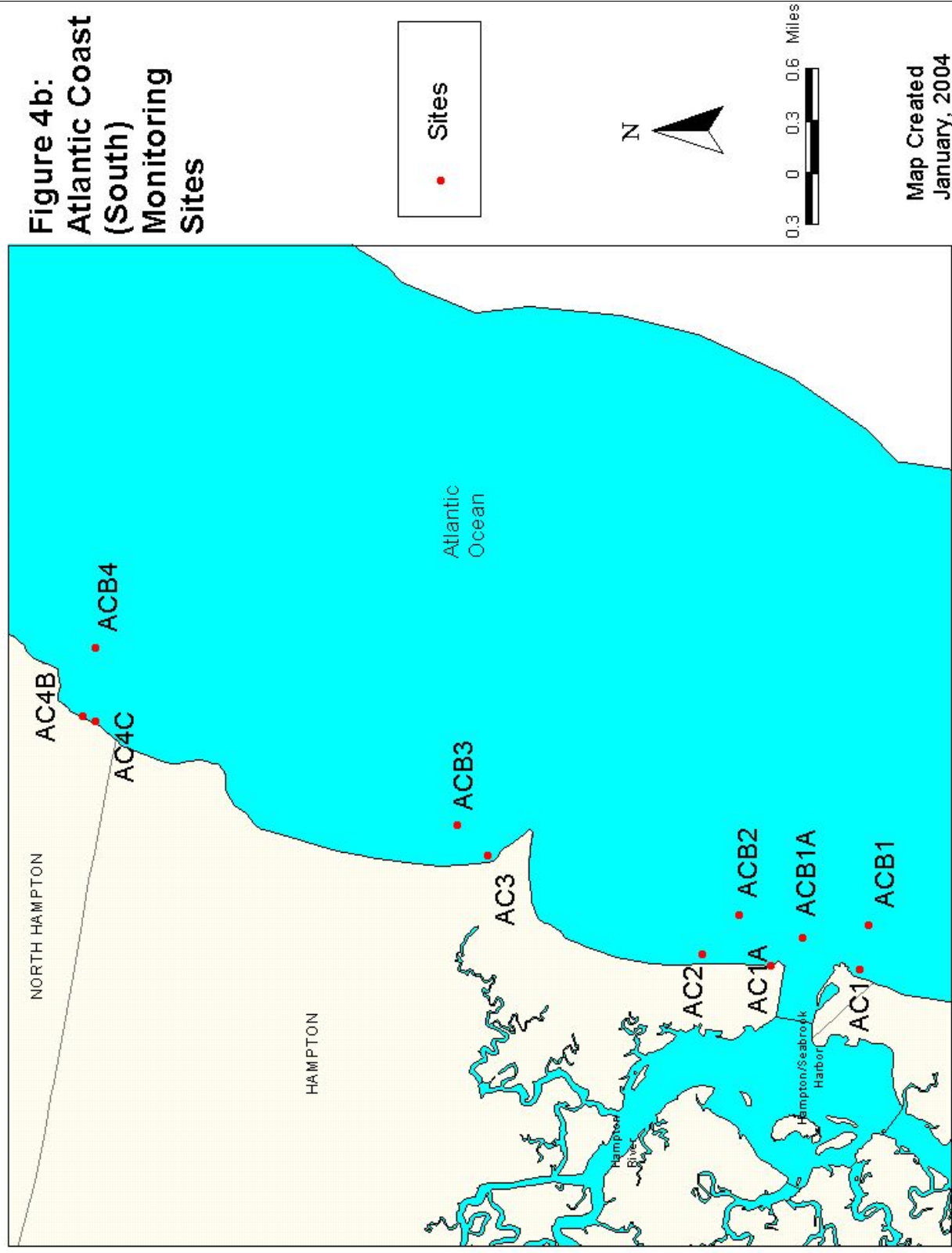
Map Created March, 2003



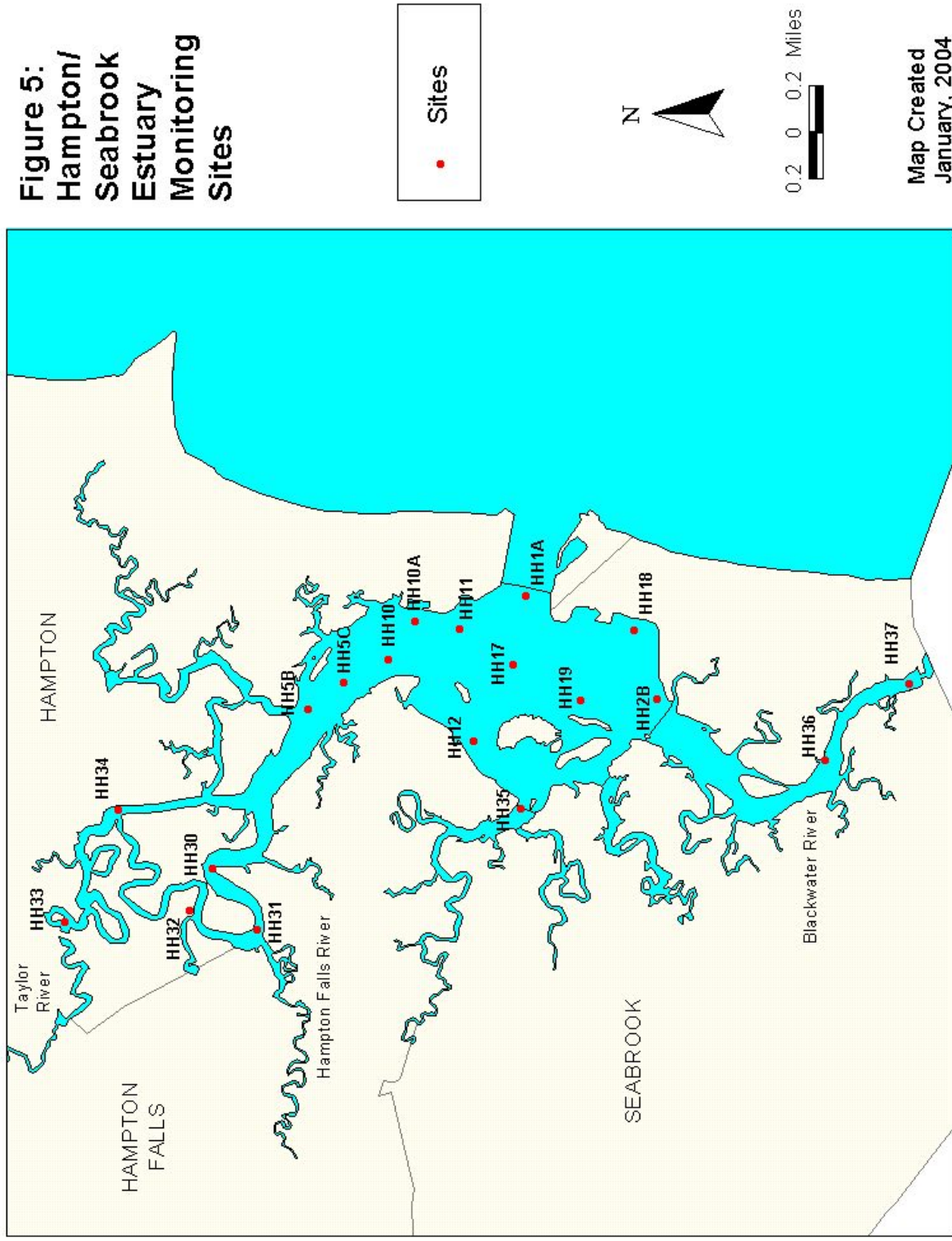
**Figure 4a:
Atlantic Coast
(North) and
Rye Harbor
Monitoring
Sites**



**Figure 4b:
Atlantic Coast
(South)
Monitoring
Sites**



**Figure 5:
Hampton/
Seabrook
Estuary
Monitoring
Sites**



Paralytic Shellfish Poisoning Monitoring

The waters of the Gulf of Maine are prone to “blooms” of phytoplankton that can produce potent neurotoxins, and filter-feeding shellfish can accumulate concentrations of these toxins such that the shellfish themselves become a public health threat to consumers. For this reason, the DES maintains a biotoxin monitoring program, focused on Paralytic Shellfish Poisoning (PSP).

The 2003 monitoring program included weekly sampling of blue mussels from Hampton/Seabrook Harbor for the period of April through October, as well as May through September sampling at Star Island, Isles of Shoals. After a series of low (<44 micrograms toxin/100 grams tissue) PSP levels to start the PSP monitoring season, an increase in toxicity was observed in early June. When the June 3, 2003 sample from Star Island exceeded the 80 microgram limit, a closure to an offshore aquaculture site was immediately instituted, and sampling at secondary stations in the nearshore environment (Rye Ledge, Little Harbor) began. Soon after this event, neighboring states began observing increased PSP levels at their sites, and implemented closures as well. Samples from numerous New Hampshire locations the following week showed elevated levels of toxin. Although no inshore sampling stations exceeded the 80 microgram threshold, the elevated toxin levels, coupled with high and rising toxin levels in southern Maine waters, prompted DES to extend the closure to all Atlantic coast growing waters on June 13, 2003. Continued sampling at primary and secondary sampling stations, including two stations in the Great Bay Estuary (oyster and mussel samples), continued in June. A continuation of the elevated, and in some cases rising, toxin levels were observed at all sites during the week of June 16, 2003, as well as during the week of June 23, 2003. Subsequent tests showed decreasing toxin levels, allowing the closure to be lifted in July.

Maine implemented another closure in the fall of 2003; however, New Hampshire sites did not show any sign of elevated or high toxicity during this period, so no additional closures were implemented. A total of 62 samples were collected in 2003.

Shellfish Tissue Testing

To comply with NSSP requirements, a new sampling program to examine the bacteriological quality of shellfish tissue was implemented in 2003. Sampling was conducted under baseline (dry weather) conditions, as well as after rainfall and wastewater treatment plant failure events. The data (Appendix 3) were used to make open/closed decisions for a number of growing waters, and will be an invaluable dataset for future sanitary surveys.



NH Department of Environmental Services and NH Fish and Game Department staff collecting oysters from Nannie Island, Great Bay. Shellfish meats and overlying waters are tested for bacteria following heavy rainfall events, or after sewage discharge/overflows. (DES Shellfish Program photo)

Pollution Source Identification and Evaluation

In support of sanitary survey development, a wide range of activities to identify, document, sample, and evaluate pollution sources in and near shellfish growing waters were undertaken in 2003. Sampling of sources in wet weather was emphasized in nearly all growing waters, especially in the Cocheco River, Lamprey River, Squamscott River, Upper Piscataqua River, and Salmon Falls River. Pollution source impact evaluations were focused on the Atlantic Coast, while sampling to support a bacterial TMDL in Little Harbor was conducted in wet weather conditions. Other evaluation studies such as wastewater treatment facility sampling and dye studies, bacterial loading estimations, autumn dry weather sampling in Hampton/Seabrook, and others were conducted in selected areas. Nearly 450 bacterial water samples were collected as part of this program in 2003.

Sanitary Surveys

DES has a goal of surveying all shellfish growing areas by the end of 2005. The following gives an overview of progress toward that goal, and the status of each project that is currently underway:

- Bellamy River: Sanitary survey begun in 2001. Shoreline survey is complete. Of the 70 sources sampled, 14 have tentatively been selected for further evaluation based on bacteria and flow data. However, in early January 2003 there were multiple sewage overflows that occurred for several hours before the City of Dover knew of the problems; thus, there were significant delays in the amount of time it took for the city to notify DES, and for DES to implement a closure. Because a similar situation occurred in the spring of 2001, DES needs to evaluate whether the City's capabilities to detect such events can occur in a manner that is timely enough to allow for (conditional) shellfish harvesting on the Bellamy River. DES Shellfish Program staff will discuss these concerns with Dover staff in 2004, and will then decide how to proceed with the Bellamy River sanitary survey. A final report is tentatively scheduled for fall 2004.
- Hampton/Seabrook: Sanitary survey begun in 2000. Expanded rainfall testing in 2000-02 led to the revision of the rainfall closure criterion in early 2003 (increased to 0.25" for all harvesting months). Shoreline survey is complete, but under constant revision. Source impact evaluations through the TMDL project were completed in the fall of 2002. Shellfish meat/water testing, critical to revising the rainfall closure criterion, began winter 2003, and will continue into 2004. Additional source evaluations and limited shoreline walks (Mill Creek) were conducted in 2003, and will continue into 2004. A final sanitary survey is planned for spring 2005.
- Other Hampton/Seabrook Tributaries: Future efforts to focus on Mill Creek and the Blackwater River. Previous studies document chronically high bacteria in Mill Creek. Bracketed sampling and a shoreline survey was conducted in 2003, with more work planned for 2004. Blackwater River sources surveyed in 2001-02; augmented ambient monitoring begun in spring 2003, scheduled to continue through 2004. A final sanitary survey is planned for spring 2005.
- Great Bay: Sanitary survey begun in 2001. Shoreline survey is nearly complete. Of the 87 sources sampled, 40 have tentatively been selected for further evaluation based on bacteria and flow data. This evaluation is scheduled to begin 2004. Some dye study work on the Exeter WWTF and the Newfields WWTF has been completed. A dye study for the Newmarket WWTF was performed in November 2003. Completion of dye study reports is planned for spring 2004. A final sanitary survey report is scheduled for fall 2004.
- Little Bay: Sanitary survey begun in 2001. Shoreline survey is complete. Of the 69 sources sampled, 18 have tentatively been selected for further evaluation based on bacteria and flow data. This evaluation is scheduled to begin in 2004. Classification of all of Little Bay was revised as part of the Oyster River dye study. Further revisions may be forthcoming per the results of the shoreline survey pollution source evaluations. A final sanitary survey report is scheduled for fall 2004.
- Upper Piscataqua River: Sanitary survey begun in 2002. Shoreline survey sampling (wet and dry weather) was completed in 2003. Source evaluation is scheduled for 2004, possibly into 2005. A dye study of the Dover WWTF is needed to delineate the safety zone around the outfall, and a joint study with the State of Maine was tentatively scheduled for summer

2003; however, the City informed DES that several of the outfall ports are blocked, and work to correct the problem is tentatively scheduled for winter/spring 2004. FDA and DES agree that the dye study should be delayed until this work is complete. A final sanitary survey report is scheduled for summer 2005.

- Cocheco River: Shoreline survey sampling (wet and dry weather) was completed in 2003. Source evaluation is scheduled for 2004, possibly into 2005. A final sanitary survey report is scheduled for summer 2005.
- Salmon Falls River: Shoreline survey sampling (wet and dry weather) was completed in 2003. Source evaluation is scheduled for 2004, possibly into 2005.

Other Activities

Wastewater Treatment Facility Dye Studies

The NSSP calls for the establishment of permanently closed “safety zones” around all wastewater treatment plant outfalls. These zones not only serve as “buffers” for relatively minor difficulties in wastewater treatment (e.g., occasionally elevated bacterial levels in plant effluent relative to discharge permit limitations), but also serve to protect harvesters from shellfish that may be contaminated by more serious plant failures (e.g., malfunction of disinfection systems). These safety zones are sized to cover the area that would be contaminated by a serious plant failure during the period of time required for plant operators to discover the problem and notify state authorities, and the time required for state authorities to institute an emergency closure of shellfish harvesting areas. Factors such as plant discharge volume and bacterial concentration, as well as current speeds and available dilution capacity of the surrounding waters, are key to properly sizing the closed safety zone. Dye/dilution studies are often utilized to gather accurate data on the dilution capacity and time of travel characteristics around a wastewater treatment plant outfall.

With the assistance of the EPA/Chelmsford Laboratory and the Town of Newmarket, DES conducted a dye/dilution study of the Newmarket wastewater treatment facility (WWTF) in November 2003. Plant operations were analyzed in the spring/summer of 2003 in order to determine what type of WWTF failure should be modeled by the dye study. Rhodamine Wt dye was injected into post-chlorination plant effluent at high tide on November 3, 2003. Dye concentrations and plume time of travel were tracked with fluorometers at several locations during the ebbing tide in the Lamprey River and portions of Great Bay. Follow-up dye tracking was performed the following day throughout Great Bay, the Lamprey River, and the Squamscott River. Data analysis and report preparation are planned for winter/spring 2004. Completion of a report for a previous dye study done in Exeter is also planned for 2004.

Annual Program Review by USFDA

In February 2002, the US Food and Drug Administration (FDA) recognized New Hampshire as a “shellfish-producing” state because its shellfish regulatory programs (growing water classification, commercial handling, patrol) comply with the National Shellfish Sanitation Program. This recognition, which is maintained through a satisfactory annual program review by FDA, allows

New Hampshire companies, including aquaculture operations, to engage in interstate commerce. For the most recent program review, staff met with FDA over the course of two days in May 2003 to perform site visits, review files, and other activities to help FDA evaluate the program. FDA issued its report in the late fall of 2003, finding the DES Shellfish Program to be in compliance with the relevant aspects of the NSSP.

Outreach Initiatives

The DES Shellfish Program engages the public through a number of outreach initiatives. The most significant of these is the development and maintenance of the program website (<http://www.des.state.nh.us/wmb/shellfish>), which not only gives information relevant to recreational harvesting (maps, FAQs, tide charts, information on openings/closings), but also provides access to a number of shellfish-related reports. Among the reports made available in PDF format are the 2002 DES Shellfish Program Annual Report, the NHEP Shellfish Indicators report, and an NHEP-funded report on juvenile clam mortality in Hampton/Seabrook Harbor. Other outreach initiatives during the project period included participation in the Aquaculture Education and Research Center's "Clam Digging for Dummies" workshops in the spring of 2003, and the preparation of a fact sheet on "Red Tide in Coastal New Hampshire" in June 2003.

As had been the case in previous years, the DES Shellfish Program continues to involve citizen volunteers from the Great Bay Coast Watch in several aspects of the program. These include collection and transportation of mussel samples for PSP testing at Star Island, sampling of pollution sources, assistance in conducting ambient monitoring, and other activities. DES intends to continue to offer opportunities for volunteer involvement in 2004.

Quality Assurance Programs

A new element to the DES Shellfish Program in 2002 was the development and implementation of Quality Assurance Project Plans (QAPPs) for bacterial monitoring, paralytic shellfish poison monitoring, and sanitary surveys. Each of these plans describes data collection methods, monitoring objectives, training needs, data review, documentation, management, and reporting, and other issues relative to the collection of environmental data. Ultimately, each QAPP outlines data collection such that the quality of the data generated by the monitoring program is of known quality, thus enabling potential data users to determine the degree to which the data suits their own needs. Implementation of these QAPPs in 2003 is described below.

The Water Quality Monitoring QAPP stipulates:

- Annual coordination meeting with key personnel: meeting was held on March 5, 2003.
- Training in monitoring procedures, to be held at annual meeting of key personnel: procedures were reviewed at the annual meeting held on March 5, 2003. A specific training session was held at the Great Bay Coast Watch (GBCW) office on April 22, 2003, but the most meaningful training (reviews of monitoring procedures) was done on an ongoing basis during sampling runs.

- Maintenance of a list of trained personnel: list was maintained at the DES Pease field office.
- Sampling of all conditionally approved areas to occur at least 6 times per year: this was accomplished, as noted in Appendix 2.
- Calibration of equipment (thermometers): as of January 1, 2003 all thermometers are now calibrated three times a year. For 2003, calibration dates were January 27, June 6, and September 25, 2003. Spreadsheets containing the calibration date, calibrator, and appropriate correction value, if applicable, are maintained at the DES Pease field office. The YSI meter was calibrated with each use per manufacturer instructions, and temperature calibration was conducted along with the thermometers.
- Preparation of quarterly reports: quarterly reports were submitted to the NH Estuaries Project, per conditions of an interagency agreement, on April 4, June 30 (this was a final report for the extended 2002 grant), and September 30, 2003.

The Paralytic Shellfish Poisoning Monitoring QAPP stipulates:

- Weekly emails to appropriate lab and field staff to ensure coordination: this was done for the period of April through October.
- Monitoring of laboratory precision and establishment of new “CF” values as needed: Jayne Finnigan of the DHHS Public Health Laboratory reported that the laboratory maintained acceptable precision throughout the sampling period, with no new CF values needed.
- Documentation of the number of samples collected: 31 Hampton samples, 18 Star Island samples, 7 Rye Ledge samples, 4 Great Bay Estuary samples, and 2 Little Harbor samples.
- Reporting of all PSP Closures: offshore Atlantic closure memo issued June 4, 2003, reopening memo issued July 8, 2003. Nearshore Atlantic closure memo issued June 13, 2003, reopening memo issued July 2, 2003.

The Sanitary Survey QAPP stipulates:

- Annual coordination meeting with key personnel: meeting was held on March 5, 2003.
- Training in monitoring procedures, to be held at annual meeting of key personnel: procedures were reviewed at the annual meeting, but the most meaningful training (reviews of monitoring procedures) was done on an ongoing basis during sampling runs.
- Documentation of training sessions held with volunteers: shoreline survey training for volunteers was held on April 22, 2003. Additional training sessions for volunteers for related projects (pollution source sampling and flow measurement of Cains Brook) were held on October 9 and October 14, 2003.
- Document growing areas for which sanitary surveys are under development: The Oyster River was completed in April 2003, Great Bay, Little Bay, Bellamy River, and Hampton/Seabrook Harbor are still underway.
- Calibration of equipment (thermometers): as of January 1, 2003 all thermometers are now calibrated three times a year. For 2003, calibration dates were January 27, June 6, and September 25, 2003. Spreadsheets containing the calibration date, calibrator, and appropriate correction value, if applicable, are maintained at the DES Pease field office. The YSI meter was calibrated with each use per manufacturer instructions, and temperature calibration was conducted along with the thermometers.

- Verify that tidal and stratification data are of acceptable quality: No tidal studies were conducted in 2003. Stratification data were collected as part of the Newmarket WWTF dye study in November 2003. Duplicate water temperature and salinity profiles were constructed for five percent of all profiles constructed, and all were within the target values of $\pm 1^{\circ}\text{C}$ for water temperature, and ± 0.5 ppt for salinity.